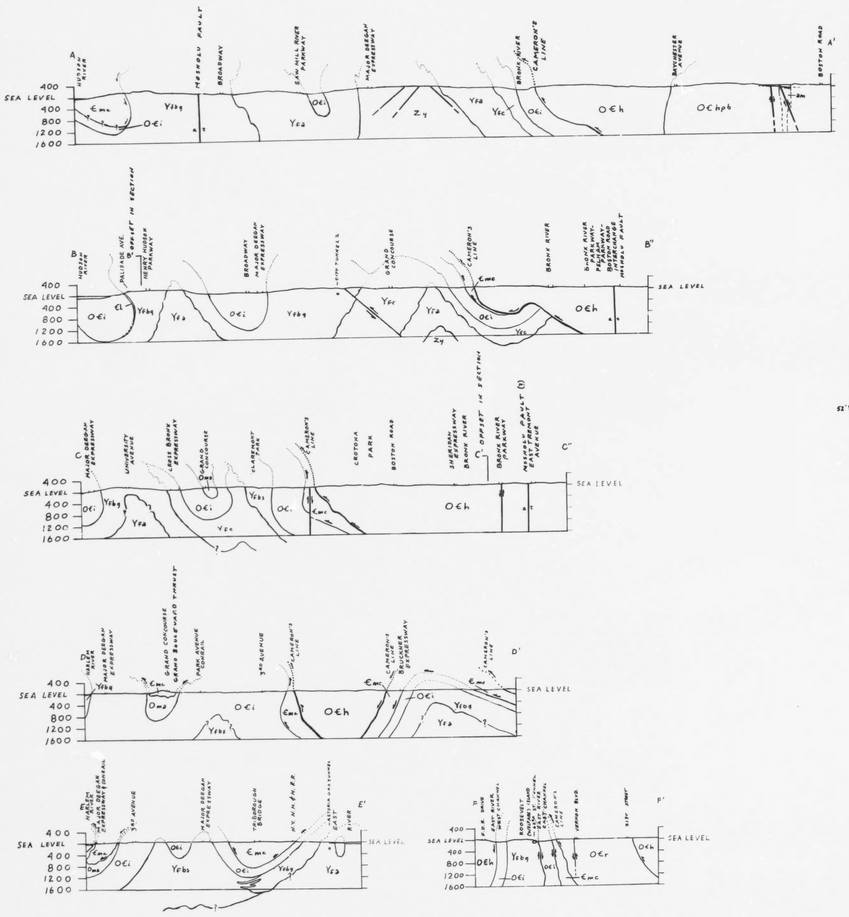
DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY



DISCUSSION

This report consists of three maps showing recent geologic mapping within the City of New York, principally Bronx County and parts of New York and Queens Counties. Sheet one contains the general geology and geologic profiles; sheets two and three contain specific engineering geologic data. These maps including more detailed discussion and information, will be issued in the USGS Miscellaneous Investigation Map Series.

All available and accessible rock outcrops within the field area were examined during the course of study. Some structural measurements shown on these maps and used in geologic interpretation were taken in excavations and tunnels no longer accessible.

DESCRIPTION OF MAP UNITS

NOTE: The rank order of the minerals usage in the descriptions are after Winkler (1979).

AUTOCHTHONOUS UNITS

Oma — Manhattan Schist, member A - Fissile, fine- to medium-grained, gray, plagioclase-garnet-muscovite-biotite-quartz schist.

Oεi — Inwood Marble - Composed of (1) coarse-grained white calcitic dolomite marble; (2) alternating medium-grained blue-gray, and white fine-grained calcite and dolomite marble; (3) white and blue-gray, predominantly fine-grained calcite marble with scattered dolomite and phlogopite crystals; and (4) fine-grained white dolomite marble with subordinate calcite and minor phlogopite.

Cl — Lowerre Quartzite - Vitreous white quartzite.

Zy — Yonkers Gneiss - Pink, black, and white banded granite gneiss. (Intrusive into Fordham Gneiss, Yfa).

Yfc — Fordham Gneiss, member C - Dark-gray to black hornblende-biotite gneiss and white quartz-plagioclase laminated and moderately banded gneiss.

Yfbs — Fordham Gneiss, member BS - Fine-grained, medium-gray, quartz-biotite-plagioclase-muscovite schist interlayered with gray biotite- muscovite-quartz granofels.

Yfbg — Fordham Gneiss, member BG - A complex black and white banded gneiss. The black bands consist of quartz-plagioclase-biotite and the white bands garnet-quartz-plagioclase-muscovite-microcline. The unit contains quartz-feldspar veins; boudinage structures with almandine and grossular garnet, quartz, and biotite; and coarse silliceous dolonite.

Yfa — Fordham Gneiss, member A - Pinkish-white to salmon-red and medium-gray banded to gneiss-biotite-plagioclase-microcline-quartz gneiss. forms an eureole around Zy.

ALLOCHTHONOUS UNITS

EXPLANATION OF MAP SYMBOLS

Contact - Dashed where approximately located; dotted where under water; solid where located under water by test borings and tunnel data; queried where uncertain underground

Fault, showing dip - Dashed where approximately located; dotted where it crosses water; D, downthrown side, U, upthrown side - Arrows show relative horizontal movement; in section: a - movement away from observer, t - movement toward observer

Thrust fault - Sawteeth on upper plate; dotted under water

Anticlinal - Showing trace of axial surface and direction of plunge. May be overturned

Synform - Showing trace of axial surface and direction of plunge. May be overturned

Axial trace, queried where uncertain

Strike and dip of axial surface of folds; arrow shows bearing and plunge of axis

Anticline or antiform, minor - Showing bearing and plunge

Syncline or Synform, minor - Showing bearing and plunge

Minor fold deforming earlier foliation

Strike and dip of foliation
Inclined

Vertical

Strike and dip of joints
Inclined

Vertical

Horizontal

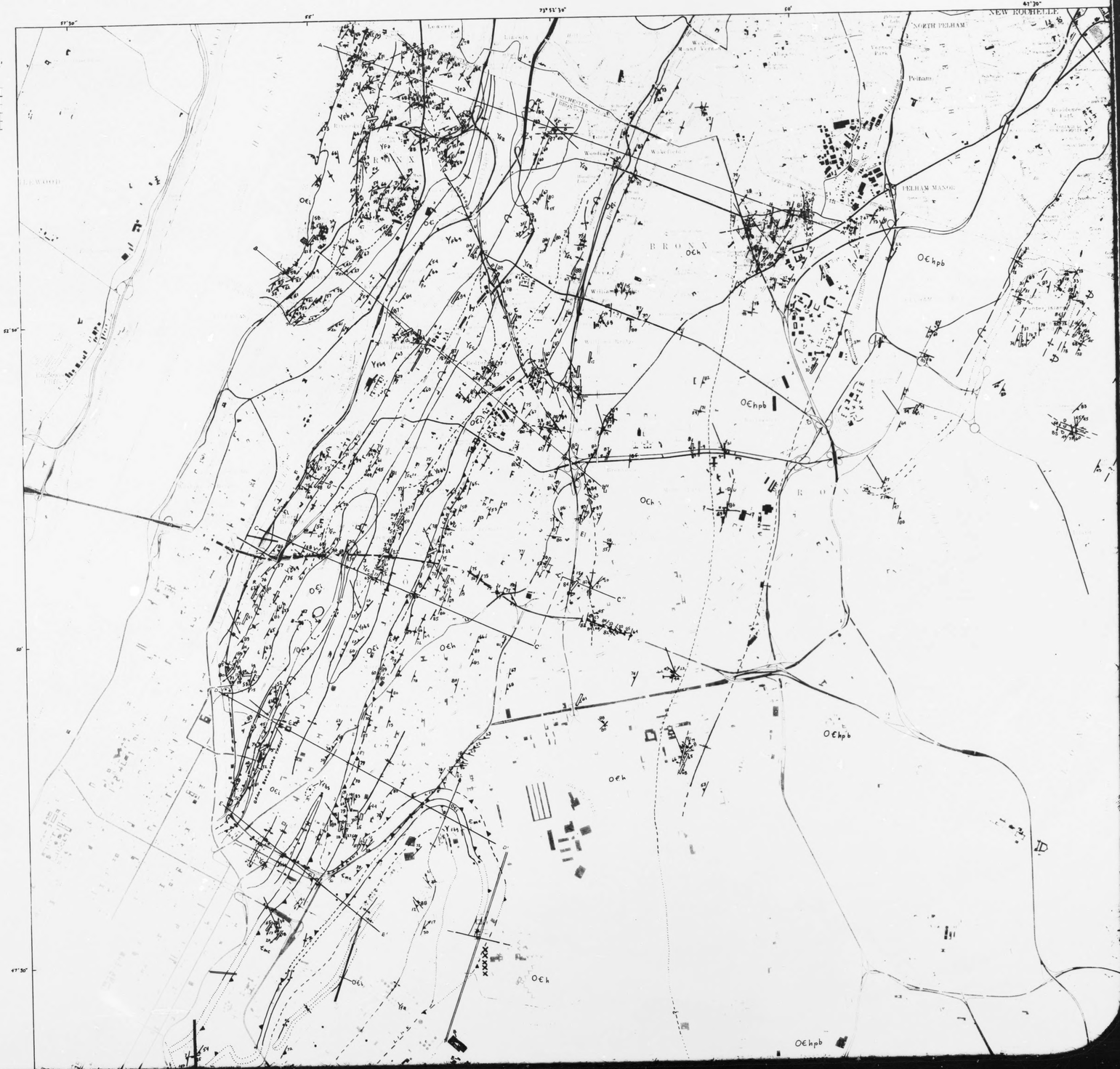
Bearing and plunge of lineation - may be combined with foliation symbol

Bearing of glacial groove or striation - Point of observation at tip of arrow

Locations of boring used to define stratigraphic contact

Borings related to building or other surface engineering structure that were used to define stratigraphic contacts - hatched if structure had not been built or had been denolished as of 1982

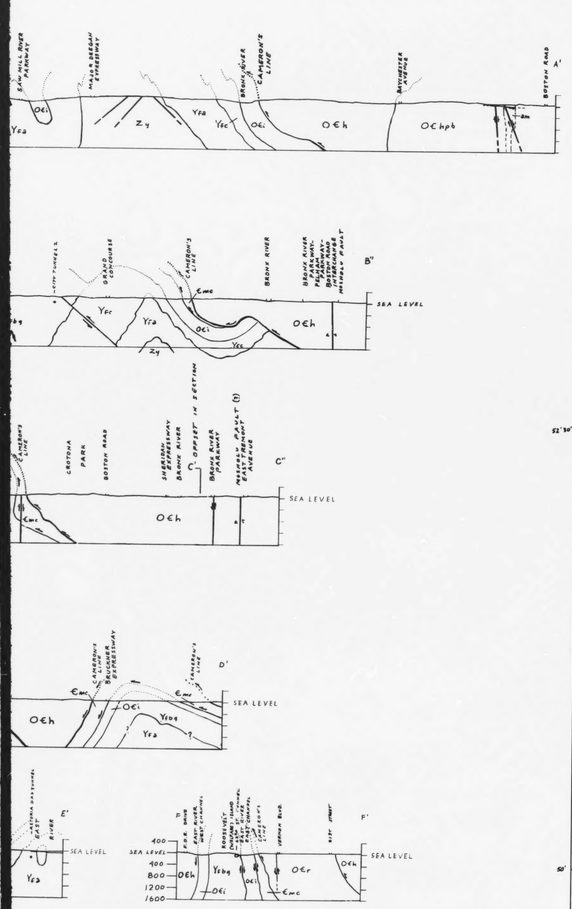
Tunnel or other subsurface engineering structure used to locate stratigraphic contacts - Water tunnels average 550 ft (168 m) below sea level; Utility tunnels 100 - 200 ft (30 - 60 m) below sea level. Contacts at tunnel level projected to the surface



F 1

OPEN-FILE REPORT 87-360

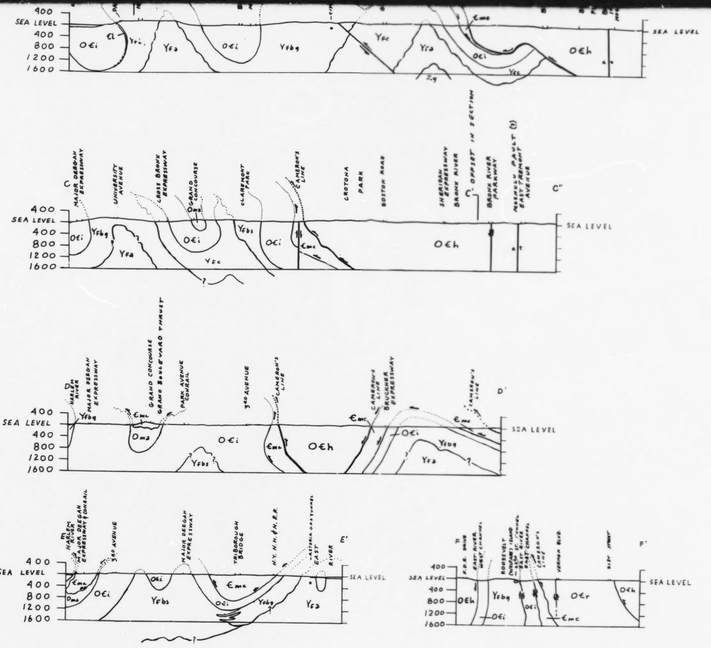
SHEET 1 OF 3

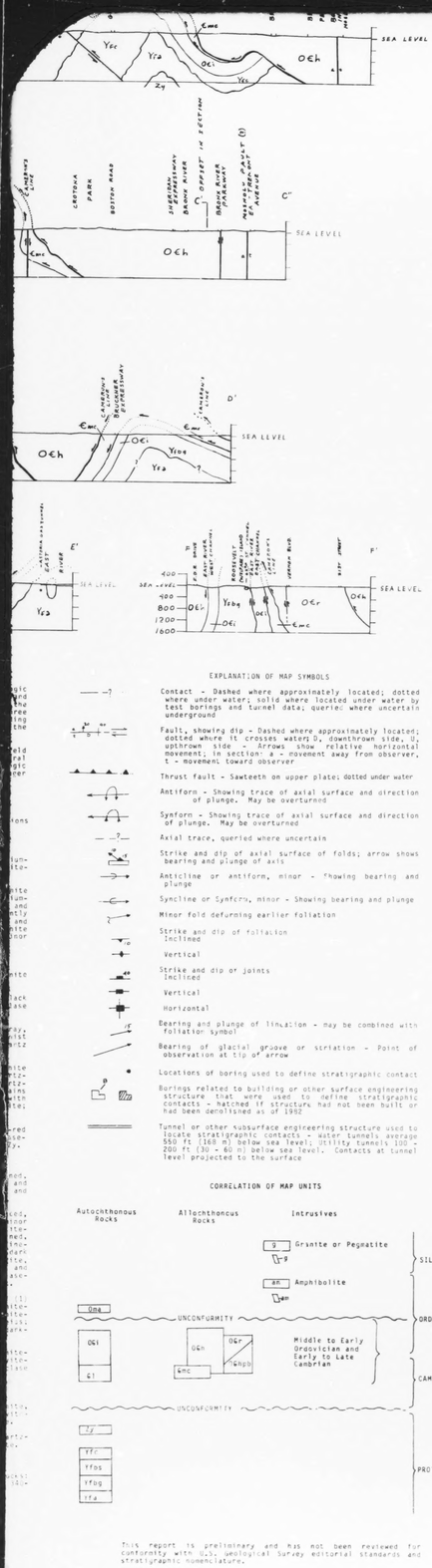


EXPLANATION OF MAP SYMBOLS

- Contact - Dashed where approximately located; dotted where under water; solid where located under water by test borings and tunnel data; queried where uncertain underground
- Fault, showing dip - Dashed where approximately located; dotted where it crosses water; D, downthrown side, U, upthrown side - Arrows show relative horizontal movement; in section: a - movement away from observer, t - movement toward observer
- Thrust fault - Sawteeth on upper plate; dotted under water
- Antiform - Showing trace of axial surface and direction of plunge. May be overturned
- Synform - Showing trace of axial surface and direction of plunge. May be overturned
- Axial trace, queried where uncertain
- Strike and dip of axial surface of folds; arrow shows bearing and plunge of axis
- Anticline or antiform, minor - Showing bearing and plunge
- Syncline or Synform, minor - Showing bearing and plunge
- Minor fold deforming earlier foliation
- Strike and dip of foliation
  - Inclined
  - Vertical
- Strike and dip of joints
  - Inclined
  - Vertical
  - Horizontal
- Bearing and plunge of lineation - may be combined with foliation symbol
- Bearing of glacial groove or striation - Point of observation at tip of arrow
- Locations of boring used to define stratigraphic contact
- Borings related to building or other surface engineering structure that were used to define stratigraphic contacts - hatched if structure had not been built or had been demolished as of 1982
- Tunnel or other subsurface engineering structure used to locate stratigraphic contacts - Water tunnels average 550 ft (168 m) below sea level; Utility tunnels 100 - 200 ft (30 - 60 m) below sea level. Contacts at tunnel level projected to the surface

F2


C
C'
SEA LEVEL
400
800
1200
1600
Oei
Yfa
Yfbs
Yfbg
Yfc
Oei
Oeh
Zy
Emc
Oei
Oeh
Oei
Yfa
Yfbs
Yfbg
Yfc
Oei



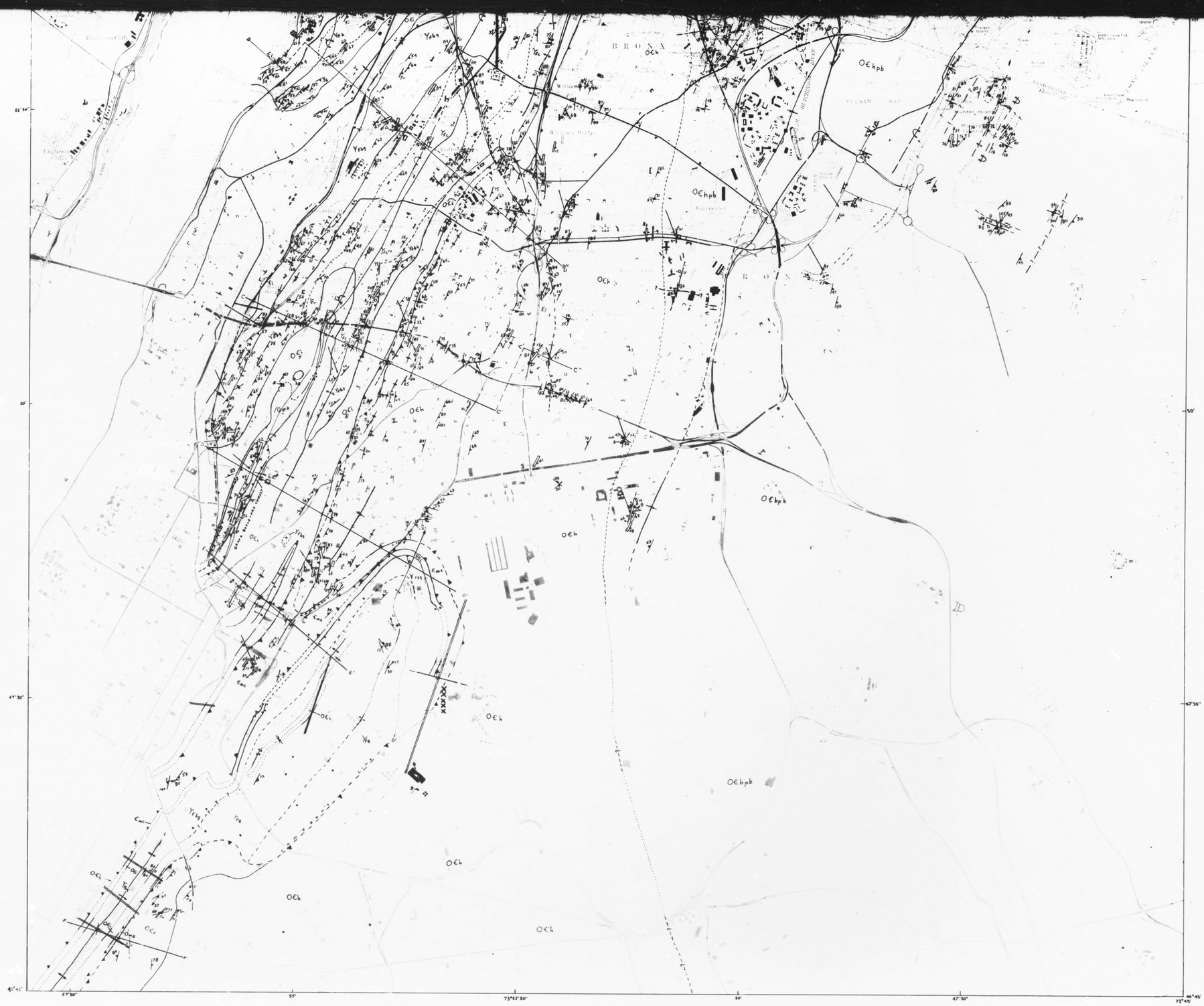
EXPLANATION OF MAP SYMBOLS

- Contact - Dashed where approximately located; dotted where under water; solid where located under water by test borings and tunnel data; queried where uncertain underground
- Fault, showing dip - Dashed where approximately located; dotted where it crosses water; D, downthrown side, U, upthrown side - Arrows show relative horizontal movement; in section: a - movement away from observer, t - movement toward observer
- Thrust fault - Sawteeth on upper plate; dotted under water
- Antiform - Showing trace of axial surface and direction of plunge. May be overturned
- Synform - Showing trace of axial surface and direction of plunge. May be overturned
- Axial trace, queried where uncertain
- Strike and dip of axial surface of folds; arrow shows bearing and plunge of axis
- Anticline or antiform, minor - Showing bearing and plunge
- Syncline or Synform, minor - Showing bearing and plunge
- Minor fold deforming earlier foliation
- Strike and dip of foliation Inclined
- Vertical
- Strike and dip of joints Inclined
- Vertical
- Horizontal
- Bearing and plunge of lineation - may be combined with foliation symbol
- Bearing of glacial groove or striation - Point of observation at tip of arrow
- Locations of boring used to define stratigraphic contact
- Borings related to building or other surface engineering structure that were used to define stratigraphic contacts - hatched if structure had not been built or had been demolished as of 1982
- Tunnel or other subsurface engineering structure used to locate stratigraphic contacts - Water tunnels average 550 ft (168 m) below sea level; Utility tunnels 100 - 200 ft (30 - 60 m) below sea level. Contacts at tunnel level projected to the surface

CORRELATION OF MAP UNITS

Autochthonous Rocks	Allochthonous Rocks	Intrusives	
		g Granite or Pegmatite	SILURIAN (?)
		am Amphibolite	
Ohq			
UNCONFORMITY			ORDOVICIAN
Ol, Cl	Och, Ocr, Emc, Ohpb		Middle to Early Ordovician and Early to Late Cambrian
UNCONFORMITY			CAMBRIAN
Yf			
Yfc			
Yfbs			
Yfbg			
Yfa			PROTEROZOIC

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.


BRONX
Och
Ochpb
Yrbq
Ycr
Emc
Ycc
Yra
Yes
Ol
Ocr
Ochpb
Och
Ochpb
Och
Och
Och
Och
Ochpb
Ochpb
Och
Och
Och
Och

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 87-360
SHEET 2 OF 3

DISCUSSION

Map sheet two is intended chiefly for use by engineers and other non-geologists to whom stratigrapic correlation and nomenclature are of little concern. Therefore, the map units have been identified by lowercase letters which describe the dominant lithology of the unit, e.g., w/cd/m.

The major common attributes of engineering significance for these units is that they can be grouped according to similarity of rock type that should give rise to reasonably uniform strength characteristics for intact rock (rock without faults or other discontinuities); e.g., schists are generally softer and have lower shear strength than gneisses due to the greater amount of mica controlling the foliation in schists.

KEY TO TERMS OF LITHOLOGIC DESCRIPTORS

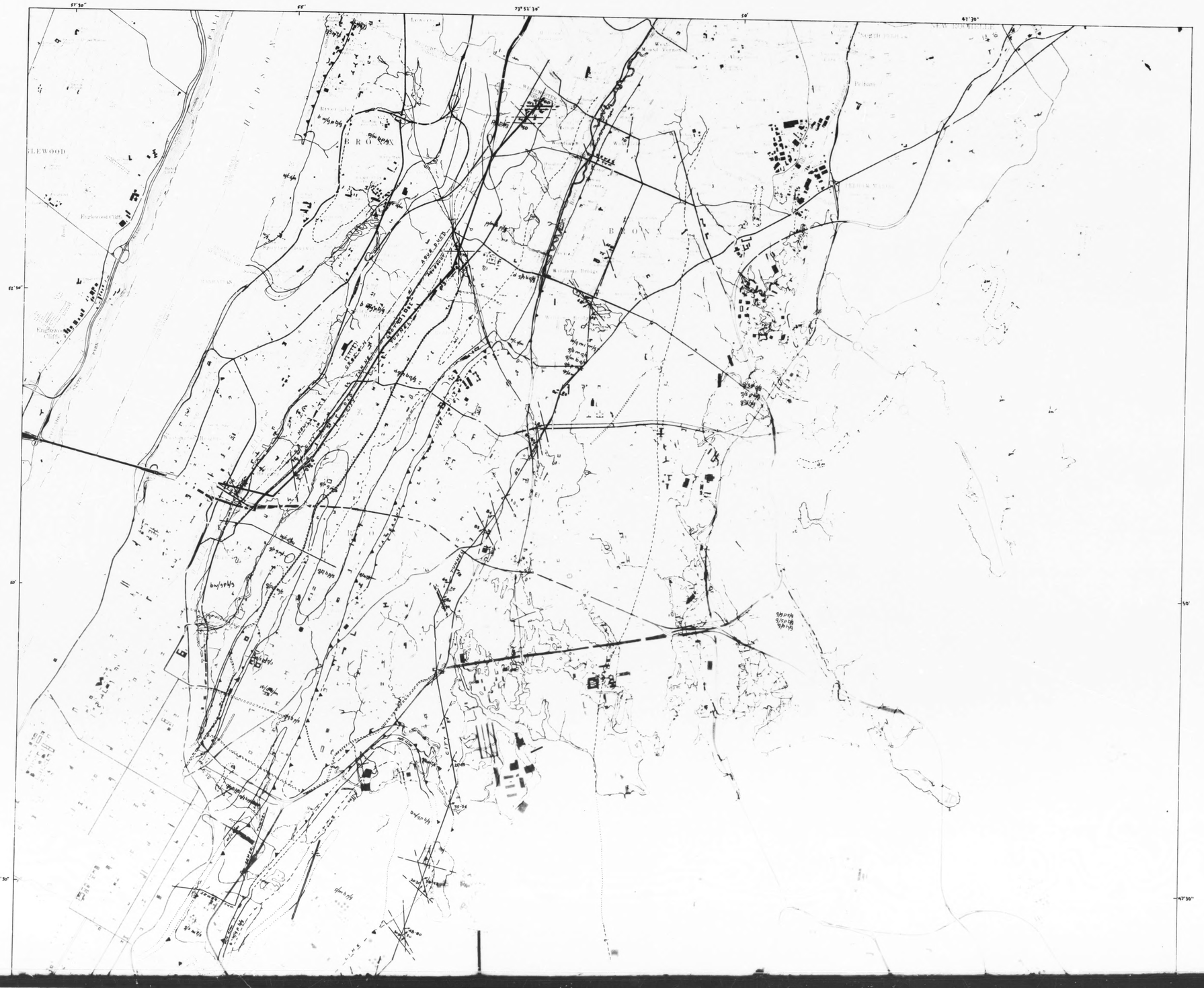
[The three categories of terms are separated by slashes in the lithologic descriptors]

Color (Prefix)	Principal minerals	Rock name (Suffix)
bw - black & white dg - dark gray y - gray gr - green p- pink w - white	b -biotite c - calcite d - dolomite g - garnet h - hornblende m - muscrvite mi - microcline p - plagioclase q - quartz (ite) s - sillimanite	g -gneiss gr - granite m - marble s - schist

EXPLANATION

- Old and new Croton aqueducts
- City tunnel #1
- City tunnel #2
- City tunnel #3
- Subway and railroad tunnels
- Consolidated Edison gas tunnels
- Sewer tunnels
- City tunnel #3 and old and new Croton aqueducts with the same alignment, one above the other
- Former drainage. Very straight furrows and ditches in fields and parallel to roads may be artificial drainage features built to lower the water table ("P" represents a pond)
- Swamp or marsh (Lines broken with "S" indicate swamp or marsh limits)
- Contact between rock types
- Approximate contact between rock unit members
- Thrust fault, teeth on upper plate; dotted underwater
- Fault, showing dip: U, upthrown side; D, downthrown side
- Crush or shear zone encountered in underground workings, usually water-bearing with chloritic gouge

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.



F
1

DISCUSSION

Map sheet two is intended chiefly for use by engineers and other non-geologists to whom stratigraphic correlation and nomenclature are of little concern. Therefore, the map units have been identified by lowercase letters which describe the dominant lithology of the unit e.g., w/cd/m.

The major common attributes of engineering significance for these units is that they can be grouped according to similarity of rock type that should give rise to reasonably uniform strength characteristics for intact rock (rock without faults or other discontinuities); e.g., schists are generally softer and have lower shear strength than gneisses due to the greater amount of mica controlling the foliation in schists.

KEY TO TERMS OF LITHOLOGIC DESCRIPTIONS

[The three categories of terms are separated by slashes in the lithologic descriptors]

Color (Prefix)	Principal minerals	Rock name (Suffix)
bw - black & white dg - dark gray g - gray gr - green p - pink w - white	b -biotite c - calcite d - dolomite g - garnet h - hornblende m - muscovite mi - microcline p - plagioclase q - quartz (ite) s - sillimanite	g -gneiss gr - granite m - marble s - schist

EXPLANATION

- Old and new Croton aqueducts
- City tunnel #1
- City tunnel #2
- City tunnel #3
- Subway and railroad tunnels
- Consolidated Edison gas tunnels
- Sewer tunnels
- City tunnel #3 and old and new Croton aqueducts with the same alignment, one above the other
- Former drainage. Very straight furrows and ditches in fields and parallel to roads may be artificial drainage features built to lower the water table ("P" represents a pond)
- Swamp or marsh (Lines broken with "S" indicate swamp or marsh limits)
- Contact between rock types
- Approximate contact between rock unit members
- Thrust fault, teeth on upper plate; dotted underwater
- Fault, showing dip: U, upthrown side; D, downthrown side
- Crush or shear zone encountered in underground workings, usually water-bearing with chloritic gouge

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

BRONX
Kingsbridge
Riverdale
Yonkers
Hastings
Dobbs Ferry
Tuckahoe
Eastchester
Pelham
Mount Vernon
New Rochelle
Scarsdale
Bronxville
Yonkers Fault
Ardsley Fault
Mosholu Fault
Pelham Bay Park Fault
Hutchinson River Fault
Throgs Neck Fault
Whitestone Fault
Flushing Fault
Flushing Bay Fault
Flushing Creek Fault
Bowery Bay Fault
Hell Gate Fault
Astoria Fault
Ravenswood Fault
Manhattan Fault
Harlem River Fault
Spuyten Duyvil Fault
Inwood Fault
Fordham Fault
Pelham Fault
Pelham Bay Fault
Throgs Neck Fault
Whitestone Fault
Flushing Fault
Flushing Bay Fault
Flushing Creek Fault
Bowery Bay Fault
Hell Gate Fault
Astoria Fault
Ravenswood Fault
Manhattan Fault
Harlem River Fault
Spuyten Duyvil Fault
Inwood Fault
Fordham Fault
City tunnel #1
City tunnel #2
City tunnel #3
Old Croton Aqueduct
New Croton Aqueduct
Shaft 18
Shaft 19
Shaft 20
Shaft 21
Shaft 22
Shaft 23
Shaft 24
Shaft 25
Shaft 26
Shaft 27
Shaft 28
Shaft 29
Shaft 30
Shaft 31
Shaft 32
Shaft 33
Shaft 34
Shaft 35
Shaft 36
Shaft 37
Shaft

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 87-360
SHEET 3 OF 3

DISCUSSION

This sheet shows contours plotted on the bedrock surface, regardless of the rock type, based on subsurface data. The contour interval is 10 feet which is the same as the topographic contour interval. This information can be used to get an approximation of overburden thickness. It should be remembered that this data can not be used as an absolute for foundation design purposes on site-specific projects. For accuracy, test borings should be made for any proposed design. The dark, more or less irregular, splotches are bedrock outcrops

EXPLANATION

Single outcrop or area of closely spaced outcrops

Contours on the bedrock surface

ACKNOWLEDGEMENTS

For test boring logs and other subsurface accessibility, I am indebted to the following: N.Y. State Department of Transportation; N.Y. City Department of General Services, Division of Public Structures, Subsurface Bureau; Triborough Bridge and Tunnel Authority; Consolidated Edison Company; N.Y. City Transit Authority; N.Y. City Board of Education, Division of School Buildings; N.Y. City Department of Environmental Protection, Bureau of Water Supply and Bureau of Sewers; Warren George, Inc.; Python Drilling; Sisto and Di Mato, Inc., construction contractors; and Mr. Alfred H. Howell for access to his property.

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

F
1

DISCUSSION

This sheet shows contours plotted on the bedrock surface, regardless of the rock type, based on subsurface data. The contour interval is 10 feet which is the same as the topographic contour interval. This information can be used to get an approximation of overburden thickness. It should be remembered that this data can not be used as an absolute for foundation design purposes on site-specific projects. For accuracy, test borings should be made for any proposed design. The dark, more or less irregular, splotches are bedrock outcrops

EXPLANATION

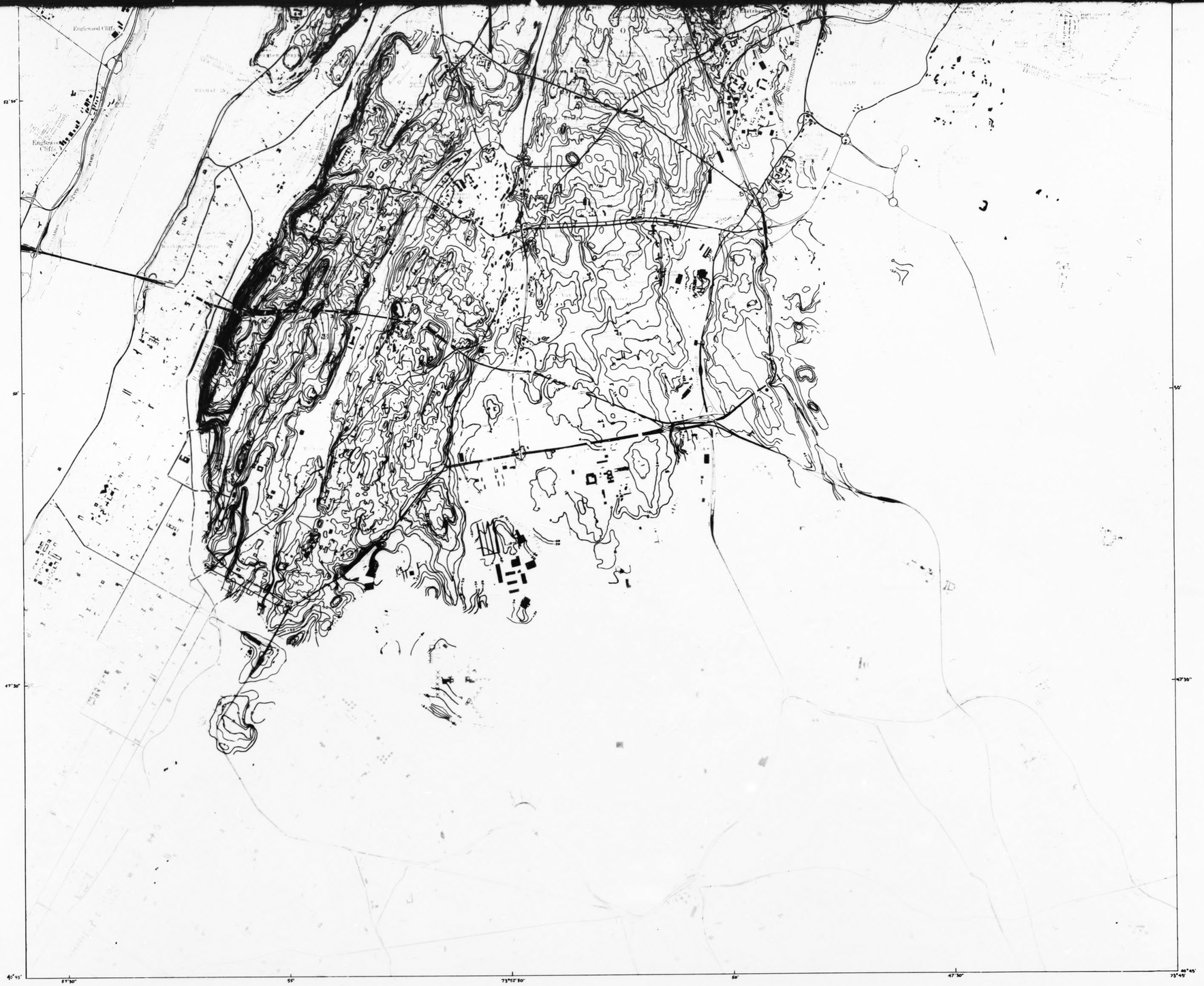
Single outcrop or area of closely spaced outcrops

Contours on the bedrock surface

ACKNOWLEDGEMENTS

For test boring logs and other subsurface accessibility, I am indebted to the following: N.Y. State Department of Transportation; N.Y. City Department of General Services, Division of Public Structures, Subsurface Bureau; Triborough Bridge and Tunnel Authority; Consolidated Edison Company, N.Y. City Transit Authority; N.Y. City Board of Education, Division of School Buildings; N.Y. City Department of Environmental Protection, Bureau of Water Supply and Bureau of Sewers; Warren George, Inc.; Python Drilling; Sisto and Di Maio, Inc., construction contractors; and Mr. Alfred H. Howell for access to his property.

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.



Base from U.S. Geological Survey Central Park, Flushing, Mount Vernon, and Yonkers, 1966 (photorevised 1979)

F 2

SHEET 3 - BEDROCK CONTOURS AND OUTCROPS

BEDROCK AND ENGINEERING GEOLOGIC MAPS OF BRONX COUNTY AND PARTS OF NEW YORK AND QUEENS COUNTIES, NEW YORK

By Charles A. Baskerville

1987